

What is claimed is:

1. An electronic pulse generation device comprising:  
an emitter element made of a dielectric material;  
5 first and second electrodes formed in contact with  
said emitter element;

means for applying alternating pulse between said  
first electrode and said second electrode to reverse or  
change polarization of said emitter element,

10 wherein electrons are emitted intermittently from said  
emitter element.

2. An electronic pulse generation device according to  
claim 1, further comprising:

15 a third electrode facing said emitter element;  
means for applying positive direct bias voltage to  
said third electrode;

wherein a vacuum space is present between said emitter  
element and said third electrode, and electrons are emitted  
20 intermittently from said emitter element toward said third  
electrode.

3. An electronic pulse generation device according to  
claim 1, wherein said emitter element is made of a  
25 piezoelectric material, an anti-ferroelectric material, or  
an electrostrictive material.

4. An electronic pulse generation device according to claim 1, wherein said means for applying alternating pulse applies a first voltage between said first electrode and said second electrode for causing said first electrode to have a potential higher than a potential of said second electrode in a first period to perform said polarization of said emitter element in one direction, and

said means for applying alternating pulse applies a second voltage between said first electrode and said second electrode for causing said first electrode to have a potential lower than a potential of said second electrode in a second period to perform said polarization reversal or polarization change of said emitter element for emitting electrons.

5. An electronic pulse generation device according to claim 1, wherein said first electrode and said second electrode are disposed in contact with a principal surface of said emitter element, with a slit defined between said first electrode and said second electrode, said emitter element being partly exposed through said slit.

6. An electronic pulse generation device according to claim 5, wherein polarization reversal or polarization change occurs in an electric field  $E$  applied to said emitter element represented by  $E = V_{ak}/d$ , where  $d$  is a width of said slit, and  $V_{ak}$  is a voltage between said first

electrode and said second electrode.

5        7. An electronic pulse generation device according to claim 6, wherein said voltage  $V_{ak}$  is less than a dielectric breakdown voltage of said emitter element.

10       8. An electronic pulse generation device according to claim 1, wherein said first electrode is formed on a first surface of said emitter element, and said second electrode is formed on a second surface of said emitter element.

15       9. An electronic pulse generation device according to claim 8, wherein polarization reversal or polarization change occurs in an electric field  $E$  applied to said emitter element represented by  $E = V_{ak}/h$ , where  $h$  is a thickness of said emitter element between said first electrode and said second electrode, and  $V_{ak}$  is a voltage between said first electrode and said second electrode.

20       10. An electronic pulse generation device according to claim 9, wherein said voltage  $V_{ak}$  is less than a dielectric breakdown voltage of said emitter element.

25       11. An electronic pulse generation device according to claim 1, wherein said alternating pulse is applied between said first electrode and said second electrode for causing said first electrode to have a potential lower than a

potential of said second electrode to reverse or change polarization of at least a portion of said emitter element; and

the polarization reversal or polarization change induces emission of electrons in the vicinity of said first electrode.

12. An electronic pulse generation device according to claim 1, wherein said alternating pulse is applied between said first electrode and said second electrode to reverse or change polarization of at least a portion of said emitter element;

the polarization reversal or polarization change causes positive poles of dipole moments in the vicinity of said first electrode to be oriented toward said first electrode, inducing emission of primary electrons from said first electrode; and

said emitted primary electrons impinge upon said emitter element to induce emission of secondary electrons from said emitter element.

13. An electronic pulse generation device according to claim 12, wherein said first electrode, said emitter element, and a vacuum atmosphere define a triple point; and

primary electrons are emitted from a portion of said first electrode in the vicinity of said triple point, and said emitted primary electrons impinge upon said emitter

element to induce emission of secondary electrons from said emitter element.